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| 09/829,749 | 04/10/2001 | Roger M. Eddy | FIS920010045US1 | 9580 |

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EXAMINER

DOLE, TIMOTHY J

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2858

DATE MAILED: 04/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/829,749

Applicant(s)

EDDY ET AL.

Examiner

Timothy J. Dole

Art Unit

2858

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103.

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrison et al. in view of Leedy (USPN 6,288,561).

Referring to claim 1, Morrison et al. discloses an electronic circuit test and repair apparatus comprising: at least one wiring analyzer (fig. 3 (12)) to locate shorts between conductors (column 6, lines 1-4), said conductors being on a surface of or embedded in a carrier substrate (column 4, lines 23-31), said conductors being intended to interconnect components to be mounted on said carrier substrate to form a circuit, said carrier substrate being devoid of all said components (column 4, lines 20-23); and at least two probes (fig. 3 (P1-Pn)) to contact said conductors in a manner controlled by said wiring analyzer (column 4, lines 41-51).

Morrison et al. does not disclose a current source to provide a current sufficient to remove shorts.

Leedy discloses a current source to provide current sufficient to remove shorts (column 6, lines 60-64). It should be noted; Leedy discloses that "high voltage or current" (column 6, line 62) is used in the repair process. Leedy also states that for repairing

circuits, the computer can supply appropriate control signals so that "appropriate voltage or current can be applied between the probe points" (column 7, lines 64-67).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the current source of Leedy into the apparatus of Morrison et al. for the purpose reducing the number of steps and therefore time needed to produce functional boards that are free of defects (column 2, lines 4-9).

Referring to claim 2, Morrison et al. further discloses a relay wiring analyzer (fig. 3 (12)), which is referred to as a computer that accepts a signal from the circuit (fig. 2 (14)), which relays the information from the probes, and could therefore be referred to as a relay wiring analyzer.

Morrison et al. does not disclose a solid state wiring analyzer.

Leedy discloses an apparatus where the wiring analyzer is a solid state wiring analyzer (fig. 2 (30)). It should be noted that Leedy uses active device switching circuitry, such as transistors (column 5, lines 40-42). Therefore the switching could be referred to as solid state switching and the computer that then analyzes the data could be called a solid state wiring analyzer.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the solid state wiring analyzer of Leedy into the apparatus of Morrison et al. for the purpose of providing two different testing speeds, increasing reliability and reducing the size of the components (column 5, line 49 and column 5, lines 52-54).

Referring to claim 3, Morrison et al. as modified discloses the apparatus as claimed except for a controller for automatic positioning of the probes.

Leedy discloses a controller for automatic positioning of the probes (claim 21).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the controller of Leedy into the apparatus of Morrison et al. for the purpose of automatically positioning the probes to reduce the possibility of human error or further damage due to additional handling.

Referring to claim 4, Morrison et al. discloses the apparatus as claimed where the probes comprise a cluster probe (column 4, lines 35-38).

Referring to claim 5, Morrison et al. discloses the test and repair apparatus as claimed except for a controller having voltage stress test capability.

Leedy et al. discloses a controller having voltage stress test capability. It should be noted, Leedy states that a computer can provide control signals to the probes so that high voltage can be provided between the appropriate probe points (column 6, lines 60-63), which could be considered a controller for voltage stress testing.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the controller of Leedy into the apparatus of Morrison et al. for the purpose of having voltage stress test capability, since it is useful in testing, to make sure a repaired short does not regenerate and to avoid further faults.

Referring to claim 6, Morrison et al. discloses the apparatus as claimed except for a controller to automate at least one of locating circuit shorts and removing circuit shorts.

Leedy discloses a controller to automate at least one of locating circuit shorts and removing circuit shorts (claim 6 (b) and (d)).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the controller of Leedy into the apparatus of Morrison et al. for the same purpose as given in claim 3, above.

Referring to claim 7, Morrison et al. discloses the apparatus as claimed wherein said at least one wiring analyzer additionally locates open circuits (column 6, lines 1-4) that are defects in said carrier substrate (column 1, lines 22-32).

3. Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lo et al. in view of Leedy.

Referring to claim 14, Lo et al. discloses an apparatus for test and repair of wiring interconnect packages, comprising: at least one wiring analyzer (fig. 1 (40)) to locate circuit shorts, a current source (fig. 1 (30)), and a cluster probe (column 4, lines 39-41). It should be noted that a cluster probe comprises a set of test probes that all simultaneously contact the device under test. Therefore, according to column 1, lines 17-19, the probing device as disclosed by Lo et al. could be called a cluster probe.

Lo et al. does not disclose that the test and repair apparatus is able to provide a current sufficient to remove shorts.

Leedy discloses a current source to provide current sufficient to remove shorts (column 6, lines 60-64).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the current source of Leedy in the apparatus of Lo et al. for the

purpose of removing shorts and repairing electronic circuits since it is stated by Lo et al. that "it is desirable to determine which networks are shorted together, so that the circuit can be repaired" (column 6, lines 54-56).

Referring to claim 15, Lo et al. further discloses a relay wiring analyzer (fig. 1 (40)), which is a processor that that accepts a signal from the relays (column 4, lines 47-57) and could therefore be referred to as a relay wiring analyzer.

Lo et al. does not disclose a solid state wiring analyzer.

Leedy discloses an apparatus where the wiring analyzer is a solid state wiring analyzer (fig. 2 (30)). It should be noted that Leedy uses a computer to analyze data from active device switching circuitry, which could be referred to as a solid state wiring analyzer as shown in claim 2, above.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the solid state wiring analyzer of Leedy into the apparatus of Lo et al. for the same purpose as given in claim 2, above.

Referring to claim 16, Lo et al. as modified discloses the apparatus as claimed except for a controller to automatically position the cluster probe.

Leedy discloses a controller for automatic positioning the cluster probe (claim 21).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the controller of Leedy into the apparatus of Lo et al. for the same purpose as given in claim 3, above.

Referring to claim 17, Lo et al. discloses the test and repair apparatus as claimed except for a controller having voltage stress test capability.

Leedy et al. discloses a controller having voltage stress test capability. It should be noted that the computer disclosed by Leedy could be considered a controller for voltage stress testing as shown in claim 5, above.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the controller of Leedy into the apparatus of Lo et al. for the same purpose as given in claim 5, above.

Referring to claim 18, Lo et al. discloses the apparatus as claimed except for a controller so that at least one of locating circuit shorts and removing circuit shorts is animated.

Leedy discloses a controller to automate at least one of locating circuit shorts and removing circuit shorts (claim 6 (b) and (d)).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the controller of Leedy into the apparatus of Lo et al. for the same purpose as given in claim 3, above.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morrison et al. in view of Leedy as applied to claim 6 above, and further in view of Craig et al.

Morrison et al. as modified discloses the test and repair apparatus as claimed except wherein the controller performs a plurality of attempts to remove the shorts.

Craig et al. discloses a plurality of attempts to remove the shorts (claim 4 (2)).

Therefore it would have been obvious to one skilled in the art at the time of the invention to incorporate a plurality of attempts as shown by Craig et al. in the apparatus of Morrison et al. as modified for the purpose of removing shorts (column 8, lines 39-55).

5. Claims 9-13 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lo et al. in view of Leedy (USPN 6,288,561), and further in view of Kerschner.

Referring to claim 9, Lo et al. discloses a method of testing wiring interconnect packages comprising: contacting a predetermined set of locations on a wiring interconnect package using a cluster probe containing a plurality of probes (claim 1); applying a predetermined set of voltages in a predetermined sequence to predetermined probes in the cluster probe (claim 1); and measuring a response to each application of voltages to detect any short circuits in the wiring interconnect package (claim 1).

Lo et al. does not disclose that open circuits will be detected, or that for any detected short circuits, a predetermined voltage will be applied to attempt to remove the detected short circuits, where the applying of voltages and measuring of responses to detect any short circuits uses the same apparatus that would be used for attempting to remove the short circuits.

Kerschner discloses a method to detect open circuits (column 4, lines 19-39).

Leedy discloses a test and repair method where for any detected short circuits, a predetermined voltage is applied to attempt to remove the detected short circuits (column 6, lines 55-58), where the applying of voltages and measuring of responses to detect any short circuits uses the same apparatus that is used for attempting to remove the short circuits (column 7, lines 10-15).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the method of open circuit detection of Kerschner and the repair method of Leedy into the method of Lo et al. for the purpose of detecting open circuits, since further fault detection is useful in determining the quality of a device under test, and repairing short circuits since it is stated by Lo et al. that “it is desirable to determine which networks are shorted together, so that the circuit can be repaired” (column 6, lines 54-56).

Referring to claim 10, Lo et al. discloses the method as claimed except for automating one of the following: the contacting at a predetermined set of locations; the detecting of abnormal open and short circuits; and the attempting to remove the short circuits.

Leedy discloses a method where at least one of the following is automated: the contacting at a predetermined set of locations; the detecting of abnormal open and short circuits; and the attempting to remove the short circuits (Leedy: column 6, lines 28-58).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the method of Leedy into the method of Lo et al. for the purpose of automatically contacting locations, detecting open circuits and short circuits, and/or attempting to remove short circuits since it would reduce the possibility of human error or further damage due to additional handling.

Referring to claim 11, Lo et al. discloses a method of automatically testing wiring interconnect packages comprising: contacting a predetermined set of locations on a wiring interconnect package using a cluster probe containing a plurality of probes (claim

1); automatically applying a predetermined set of voltages in a predetermined sequence to predetermined probes in the cluster probe (claim 1); and automatically measuring a response to each application of voltages to detect any short circuits in the wiring interconnect package (claim 1). It should be noted that the processor of Lo et al. controls the whole testing process (column 4, lines 58-61).

Lo et al. does not disclose that open circuits will be detected, or that for any detected short circuits, a predetermined voltage will be automatically applied to attempt to remove the detected short circuits.

Kerschner discloses a method to detect open circuits (column 4, lines 19-39).

Leedy discloses a test and repair method where for any detected short circuits; a predetermined voltage is automatically applied to attempt to remove the detected short circuits (column 6, lines 55-58).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the method of open circuit detection of Kerschner and the repair method of Leedy into the method of Lo et al. for the same purpose as given in claim 9, above.

Referring to claim 12, Lo et al. discloses a relay switching module (fig 1 (42)) for controlling the relays.

Lo et al. does not disclose that the detecting of opens or shorts is executed at a first higher speed using a solid state switching module or that the relay switching module is used to attempt to remove shorts.

Leedy discloses that testing is executed at a first higher speed using a solid state switching module (fig 2 (50)), (column 5, lines 40-42 and 46-48). It should be noted that Leedy uses a computer to analyze data from active device switching circuitry, which could be referred to as a solid state wiring analyzer as shown in claim 2, above. Leedy also discloses an attempt to remove shorts (column 6, lines 60-64).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the solid state switching module and repair method of Leedy into the method of Lo et al. for the purpose of detecting opens or shorts at a higher speed, increasing reliability, reducing the size of components and attempting to remove shorts using relays, since relays are more durable than transistors in that they can handle a larger current or voltage spike used for repairing short circuits.

Referring to claim 13, Lo et al. discloses the method as claimed except for automating the contacting of the wiring interconnect package.

Leedy discloses a method where contacting the wiring interconnect package is additionally automatically actuated by a controller (column 6, lines 28-39).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the method of Leedy into the method of Lo et al. for the purpose of automatically contacting the wiring interconnect package since it would reduce the possibility of human error or further damage due to additional handling.

Referring to claim 19, Lo et al. discloses a signal-bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method of testing wiring interconnect packages (column 4, line 61

– column 5, line 5), comprising: contacting a predetermined set of locations on a wiring interconnect package using a cluster probe containing a plurality of probes (claim 1); applying a predetermined set of voltages in a predetermined sequence to predetermined probes in the cluster probe (claim 1); and measuring a response to each application of voltages to detect any short circuits in the wiring interconnect package (claim 1).

Lo et al. does not disclose that open circuits will be detected, or that for any detected short circuits, a predetermined voltage will be applied to attempt to remove the detected short circuits, where the applying of voltages and measuring of responses to detect any short circuits uses the same apparatus that would be used for attempting to remove the short circuits.

Kerschner discloses a method to detect open circuits (column 4, lines 19-39). Leedy discloses a test and repair method where for any detected short circuits, a predetermined voltage is applied to attempt to remove the detected short circuits (column 6, lines 55-58), where the applying of voltages and measuring of responses to detect any short circuits uses the same apparatus that is used for attempting to remove the short circuits (column 7, lines 10-15).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the method of open circuit detection of Kerschner and the repair method of Leedy into the method of Lo et al. for the same purpose as given in claim 9, above.

Response to Arguments

Art Unit: 2858

6. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to show the state of the art with respect to short circuit testing and repair.

USPN 5,570,027 to Stans et al.: This patent shows a method and apparatus for testing pc boards.

USPN 5,357,191 to Grace: This patent shows a method and apparatus for testing unpopulated circuit boards.

USPN 5,266,901 to Woo: This patent shows a method and apparatus for testing interconnection networks.

USPN 5,145,547 to Chen: This patent shows an apparatus to automatically repair short circuits.

USPN 5,103,557 to Leedy: This patent shows a probing apparatus for testing integrated circuits.

USPN 4,785,235 to Hendricks et al.: This patent shows a method for electrical short testing.

USPN 4,471,298 to Frohlich: This patent shows an apparatus for automatically testing pc boards.


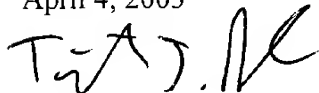
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Dole whose telephone number is 703-305-7396. The examiner can normally be reached on Mon. thru Fri. from 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on 703-308-0750. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

TJD
April 4, 2003



N. Le
Supervisory Patent Examiner
Technology Center 2800